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Hydrodynamic cooling of Rb87 thermal clouds in a time dependent potential GHAZAL BEHINAEIN, PEYMAN AHMADI, BRIAN TIMMONS, GIL SUMMY, Oklahoma State University — There has been much theoretical work done on investigating the behavior of an atomic cloud in presence of a time dependent potential [1, 2]. We study new experimental methods to realize such potentials and explore the atomic cloud's behavior in their presence. We load Rb87 atoms, with densities within the hydrodynamic regime, into an optical trap consisting of two far-off-resonant CO_2 laser beams propagating perpendicularly. The vertical beam is abruptly turned off causing momentum and space oscillations of the atomic cloud in the horizontal beam. In a second experiment, the cross section of the two beams is displaced from their foci. The spatial width of the cloud is now significantly increased at specific positions inside the trap. Releasing the optical trap at such positions leads to the clouds expansion in the axial direction, and a more efficient cooling. In this poster we describe the details of our optical set up and report our latest results. [1] P.W.H. Pinske et al., Phys. Rev. Lett. **78**, 990 (1997) [2] I. Shvarchuck et al., Phys. Rev A **68,** 063603 (2003)

Ghazal Behinaein
Oklahoma State University

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